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10/779,854	02/18/2004	Toshihide Ezoe	Q79759	9456

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EXAMINER	
RAMDHANIE, BOBBY	

ART UNIT	PAPER NUMBER
1797	

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12/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/779,854	EZOE ET AL.	
	Examiner	Art Unit	
	Bobby Ramdhanie, Ph.D.	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) *34-40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claim 8 is withdrawn in view of the Allen et al reference. Rejections based on the newly cited reference(s) follow.

Election/Restrictions

2. Applicant's election with traverse of Claims 1-33 in the reply filed on 10/12/2007 is acknowledged. The traversal is on the ground(s) that amendments to Group I would make Group I allowable, and therefore claims of dependent Group II would be allowable as well. This is not found persuasive because amendments to Group I have not put the claims of Group I in condition of allowance, Group I has a separate utility, and the scope of the claims of Group II would require a separate search.

3. This application contains claims drawn to an invention nonelected with traverse in the reply filed on 10/12/2007. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01. Group II has been withdrawn from consideration by the Examiner as being directed towards a non-elected invention.

The requirement is still deemed proper and is therefore made FINAL.

Response to Arguments

1. Applicant's arguments filed 10/15/2007 have been fully considered but they are not persuasive. The following reasons are why:

2. Claims 1-5, 12-20, & 22-29 have rejected over Wagner et al. Applicants argue that Claim 1 is novel over the Wagner et al reference. Applicants also argue that the

Examiner has misread this reference as pertaining to the Applicant's claimed invention. Applicants have also requested that Examiner point out in the Wagner et al reference where a hydrophobic polymer on a biosensor substrate is referenced. Examiner is happy to oblige.

3. First, Applicants argue that Claim 1 is novel over the Wagner et al reference. Examiner respectfully disagrees. Original Claim 1 recites, "A biosensor comprising a substrate coated with a hydrophobic polymer." The Wagner et al reference teaches this Claimed invention in the "Other Publications" section (please see Pale-Grosdemange et al reference where the gold is substrate, the self assembled monolayer in the title is defined as a hydrophobic polymer (only moderately hydrophilic). In addition, Linford et al teaches long chain alkyl monolayers on silicon and gold surfaces. The alkyl monolayers are hydrophobic; and Prime et al teaches organic monolayers for studying absorption of proteins at surfaces. Examiner takes the position that an organic compound will be hydrophobic.

4. Second turning to inside the Wagner et al reference, below is a list of sections which the Wagner et al reference teaches the invention recited in the original Claim 1. Figure 5; Column 2 line 63 to Column 3 line 1; Column 7 line 57 to Column 8 line 1; & Column 8 lines 25-27). Examiner would like to especially point out the use of a lipid bilayers or monolayers. Lipids are inherently hydrophobic in nature.

5. Claims 1, 2, 6, 7, & 9 are rejected over Allen et al. Applicants argue amended Claim 1 is clearly novel over the Allen et al reference because applicants allege Allen et al does not disclose the presence of functional groups capable of immobilizing a

physiologically active substance in association with a hydrophobic polymer. In addition, Applicants argue the rejection of Claim 6 and argues that the examiner has not given a detailed explanation as to how this is prior art over Claims 6, 7, 9, and now 8 as well.

6. Applicants request that Examiner detail how the Allen et al reference is prior art over the above Claims. Examiner is happy to oblige. First, For Claim 1, Allen et al teaches an acrylic (hydrophobic polymer) ester copolymer for coating a metal electrode for use on biosensors (Abstract). These copolymers have an alcohol substituent (R= OH^-). Acrylate polymers consist of the generic structure as shown below: Exhibit A. The simplest R group can be defined as a hydrogen atom, which is part of an alcohol group, which is part of a bigger group; a carboxylic group, Exhibit B. Furthermore the generic structure can also be modified to have a methyl substituent and form a methoxy substituent; Exhibit C. Allen et al discusses the alcohol group, which clearly can be used to immobilize a "physiologically active substance."

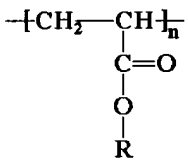

Exhibit A

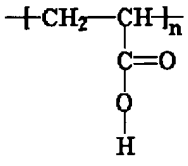

Exhibit B

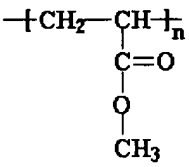

Exhibit C

7. As for Claim 6, 7, and 9, Applicant teaches the way to measure the swell ratio. Examiner would like to point out Page 11 First Sentence, "In the present invention, the ratio of swelling is expressed by (film thickness in a swelling state)/(film thickness in a dry state)." Examiner takes the position that Allen et al (Abstract) teaches the same

definition of swelling as "capable of absorbing 10-50% of their dry weight of water." In the very basic simple example, if 1 gram of dry weight of the copolymer absorbs 50% of its weight (i.e. – 0.5 g), then the swell ratio = 1.5g/1g = swell ratio of 1.5.

8. Claims 1, 2, 3, & 21 are rejected under Yu. Applicants argue that the reference is untenable and should be withdrawn. Applicants argue that Yu does not even relate to a biosensor. Examiner respectfully disagrees. Yu teaches a diamond-like surface (substrate) which can be modified with Langmuir-Blodgett layer (hydrophobic polymer). This is taught in (Column 3 lines 5-9; Column 3 lines 30-41; Column 4 lines 17-22; and Column 4 lines 34-42). This is well within the scope of the claimed invention. Furthermore, Yu teaches that this device is used in surface plasmon resonance spectroscopy (Column 7 lines 1-5). This explicitly states the use of this device as a biosensor.

9. Claims 10 & 11 rejected over Allen in view of Wagner et al. Claims 10 & 11 depend on Claim 6, which is explained in detail above. As for the statement that Wagner et al merely is cited for the metal surface or metal film; Examiner would like to point out that Wagner et al does indeed teach hydrophobic polymers. Wagner et al teaches the coating is "**optionally**" a metal film (Column 14 line 29). For the reasons outlined above, Wagner et al can not be taken to mean the coating is a metal film.

10. Claims rejected under 30-33 over Wagner et al in view of Targoz. Applicants argue that Targoz is non-analogous art. Applicants argue that the motivation to combine the two references is not taught by Wagner et al alone or by both. Examiner respectfully disagrees. Nylon is an acrylic polymer. Wagner et al teaches the use of an acrylic

polymer for use as the coating (Column 14 line 9). Targoz teaches the use of a surfactant to increase the binding of the polymer to the substrate. There is clear motivation for one to combine the two references

Response to Amendment

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1-5, 12-20, & 22-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Wager et al (US6329209).

13. Claims 1, 2, 6, 7, & 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Allen et al (US5476094).

14. Claims 1, 2, 3, & 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Yu (US5273788).

15. Regarding Claim 1, Wagner et al, Allen et al, & Yu all teach a biosensor comprising a substrate coated with a hydrophobic polymer having a functional group capable of immobilizing a physiologically active substance, the polymer being on a surface of the substrate to be contacted with the physiologically active substance (see Prior Art rejections and Arguments above). In addition, this claim is to a device and not

the intended use of the device. The amendment introduces an intended use for the device and does not carry patentability weight for the claim.

16. For Claim 2, Wagner et al, Allen et al and Yu all teach the biosensor according to claim 1, which comprises a metal surface or metal film coated with a hydrophobic polymer (See Prior art rejections and arguments above).

17. For Claim 3, both Wagner et al and Yu teach the biosensor according claim 2, wherein the metal surface or metal film comprises a free-electron metal selected from a group consisting of gold, silver, copper, platinum and aluminum (See prior art rejections and arguments above).

18. For Claim 4, Wagner et al teaches the biosensor according to claim 1, wherein the coating thickness of the hydrophobic polymer is between 1 angstrom and 5,000 angstroms (See prior art rejections).

19. For Claim 5, Wagner et al teaches the biosensor according to claim 1, wherein the coating thickness of the hydrophobic polymer is between 10 angstroms and 2,000 angstroms (see prior art rejections).

20. For Claim 6, Allen et al teaches a biosensor comprising a substrate coated with a film whose swelling degree in pure water at 25°C is between 1 and 5 with respect to the film thickness in a dry state, the film being on a surface of the substrate to be contacted with a physiologically active substance (see prior art rejections and arguments above). In addition, this claim is to a device and not the intended use of the device. The amendment introduces an intended use for the device and does not carry patentability weight for the claim.

21. For Claim 7, Allen et al teaches the biosensor according to claim 6, wherein the film whose swelling degree in pure water at 25°C is between 1 and 5 with respect to the film thickness in a dry state is an organic substance (see prior art rejections and arguments above).

22. For Claim 9, Allen et al teaches the biosensor according to claim 6, wherein the film whose swelling degree in pure water at 25°C is between 1 and 5 with respect to the film thickness in a dry state comprises a hardening agent (see prior art rejections and arguments above).

23. For Claim 12, Wagner et al teaches the biosensor according to claim 1, which has a functional group capable of immobilizing a physiologically active substance on the outermost surface of the substrate (see prior art rejections and arguments above).

24. For Claim 13, Wagner et al teaches the biosensor according to claim 12, wherein the functional group capable of immobilizing a physiologically active substance is -OH, -SH, -COOH, -NR1R^2 (wherein each of R^1 and R^2 independently represents a hydrogen atom or lower alkyl group), -CHO, -NR^1R^2 R^3 (wherein each of $R^{\sim}$ R^2 and R^3 independently represents a hydrogen atom or lower alkyl group), -NCO, -NCS, an epoxy group, or a vinyl group (see prior art rejections and arguments above).

25. For Claim 14, Wagner et al teaches the biosensor according to claim 12, which comprises a substrate coated with a hydrophobic polymer, and wherein a functional group capable of immobilizing a physiologically active substance by covalent bond is introduced in a hydrophobic polymer by chemical treatment of the surface of said substrate (see prior art rejections and arguments above).

26. For Claim 15, Wagner et al teaches the biosensor according to claim 1, which comprises a linker for immobilizing a physiologically active substance to the hydrophobic polymer on a surface of the biosensor (see prior art rejections and arguments above).

27. For Claim 16, Wagner et al teaches the biosensor according to claim 15, wherein the linker is a linker for immobilizing a physiologically active substance on a surface of the biosensor by chemical bonding (see prior art rejections and arguments above).

28. For Claim 17, Wagner et al teaches the biosensor according to claim 15, wherein the linker is a linker for immobilizing a physiologically active substance on a surface of the biosensor by covalent bonding (see prior art rejections and arguments above).

29. For Claim 18, Wagner et al teaches the biosensor according to claim 15, wherein the linker is a compound represented by the formula (1) X-L-Y... formula (1) wherein X represents a group capable of reacting with a functional group of a hydrophobic polymer, L represents a bivalent linking group, and Y represents a group capable of immobilizing a physiologically active substance (see prior art rejections and arguments above).

30. For Claim 19, Wagner et al teaches the biosensor according to claim 18, wherein the total number of atoms of L of the formula (1) is 2 to 1000 (see prior art rejections and arguments above).

31. For Claim 20, Wagner et al teaches the biosensor according to claim 1, which is used in non-electrochemical detection (see prior art rejections and arguments above).

32. For Claim 21, Yu teaches the biosensor according to claim 1, which is used in surface plasmon resonance analysis (Abstract, Column 7 lines 1-5).

33. For Claim 22, Wagner et al teaches a method for producing the biosensor according to claim 1, which comprises a step of coating a substrate with a hydrophobic polymer (See prior art rejections and arguments above).

34. For Claim 23, Wagner et al teaches the method for producing the biosensor according to claim 22, which further comprises a step of performing chemical treatment of a surface of the substrate (see prior art rejections and arguments above).

35. For Claim 24, Wagner et al teaches the method for producing the biosensor according to claim 22, which further comprises a step of reacting the substrate with a hydrophobic polymer with a linker (see prior art rejections and arguments above).

36. For Claim 25, Wagner et al teaches the biosensor according to claim 1, wherein a physiologically active substance is bound to the hydrophobic polymer on a surface of the biosensor by covalent bonding (see prior art rejections and arguments above).

37. For Claim 26, Wagner et al teaches a method for immobilizing a physiologically active substance to the biosensor according to claim 1, which comprises a step of making said biosensor come into contact with said physiologically active substance, so that said physiologically active substance is bound to the hydrophobic polymer on a surface of said biosensor by covalent bonding (see prior art rejections and arguments above).

38. For Claim 27, Wagner et al teaches a method for detecting or measuring a substance interacting with a physiologically active substance, which comprises a step of

making the biosensor according to claim 1, to the surface of which said physiologically active substance is bound by covalent bonding, come into contact with a test substance (see prior art rejections and arguments above).

39. For Claim 28, Wagner et al teaches the method according to claim 27, wherein a substance interacting with the physiologically active substance is detected or measured by a non-electrochemical method (see prior art rejections and arguments above).

40. For Claim 29, Wagner et al teaches the method according to claim 27, wherein a substance interacting with the physiologically active substance is detected or measured by surface plasmon resonance analysis (see prior art rejection and arguments above).

Claim Rejections - 35 USC § 103

41. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

42. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

43. Claims 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al in view of Targoz. Regarding Claim 30, Wagner et al teaches a method for

detecting or measuring a substance interacting with a physiologically active substance which is bound to the surface of a biosensor comprising a substrate coated with a hydrophobic polymer having a functional group capable of immobilizing the physiologically active substance (Claims 1 & 2). Wagner et al does not teach detection or measurement in the presence of a surfactant (Abstract). Targoz teaches this feature. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wagner et al with Targoz because Wagner et al teaches the use of an acrylic polymer for use as the coating (Column 14 line 9). Targoz teaches the use of a surfactant to increase the binding of the polymer to the substrate. It would have been obvious to secure the coating to the surface of the substrate to keep the device together.

44. For Claim 31, Wagner et al in combination with Targoz teaches the method according to claim 30. Targoz further teaches that the surfactant is a nonionic surfactant (Column 7 lines 34-41).

45. For Claim 32, Wagner et al in combination with Targoz teaches the method according to claim 30. Wagner et al further teaches a solution containing at least a test substance and a substrate coated with hydrophobic polymer on the surface of which a physiologically active substance is bound by covalent bonding (Claim 1 & 2). Targoz further teaches, a surfactant is allowed to come into contact with a biosensor (Abstract).

46. For Claim 33, Wagner et al teaches a method for detecting or measuring a substance interacting with a physiologically active substance which is bound to the surface of a biosensor comprising a substrate coated with a hydrophobic polymer

(Claims 1 & 2). Wagner et al also teaches a method wherein a solution containing at least a test substance is allowed to come in contact with a biosensor comprising a substrate coated with a hydrophobic polymer, on the surface of which a physiologically active substance is bound by covalent bonding. Wagner et al neither teaches a solution containing a surfactant that comes in contact with the hydrophobic polymer and substrate nor does Wagner et al teach a method where the surfactant is between 0.0001-1% by weight. Targoz teaches a step for enhancing the film properties using a test substance and a surfactant in a solution to be applied to the hydrophobic polymer and substrate which is within 0.01-2% (Claim 7). It would have been obvious to one skilled in the ordinary art at the time the invention was made to modify Wagner et al with Targoz because according to Targoz, the addition of the surfactant to the hydrophobic polymer aids in helping the polymer attach to the substrate (Abstract).

47. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Allen et al Regarding Claim 8, Allen et al teaches The biosensor according to claim 6. Allen et al does not teaches wherein the film whose swelling degree in pure water at 25°C is between 1 and 5 with respect to the film thickness in a dry state comprises a high polymer comprising 50% by weight or more of monomers having a solubility in water of 20% by weight or less. It would have been obvious to one of ordinary skill in the art at the time the invention was made because Allen et al teaches combining copolymers to create the instant invention and furthermore this would be within reason for one of ordinary skill in the art to perform to come up with without undue experimentation.

48. Claims 10 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allen et al in further view of Wagner et al. Regarding Claim 10, Allen et al teaches a biosensor according to Claim 6 which comprises a film whose swelling degree in pure water at 25 °C is between 1 and 5 with respect to the film thickness in a dry state. Allen et al does not teach the film coating to be on the metal surface or metal film. Wagner et al teaches a biosensor comprising a metal or metal film coated with a hydrophobic polymer. It would have been obvious to one skilled in the ordinary art at the time the invention was made to modify Allen et al with Wagner et al because according to Allen et al, the acrylic copolymers are effective, for example in controlling the diffusion of analytes/reactants to a covered biosensor (Column 6 lines 47-50).

49. For Claim 11, Allen et al teaches a biosensor according to Claim 6. Allen et al does not teach that the biosensor comprises a metal or metal film comprising a free electron metal selected from a group consisting of gold, silver, copper, platinum or aluminum. Wagner et al teaches a biosensor comprising a metal or metal film comprising a free electron metal selected from a group consisting of gold, silver, copper, platinum or aluminum (Column 14, lines 29-36). It would have been obvious to one skilled in the ordinary art at the time the invention was made to modify Allen et al with Wagner et al because according to Allen et al, the acrylic copolymers are effective, for example in controlling the diffusion of analytes/reactants to a covered biosensor.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bobby Ramdhanie, Ph.D. whose telephone number is 571-272-1447. The examiner can normally be reached on Mon-Fri 8-5 (Alt Fri off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BR

Walter D. Griffin

WALTER D. GRIFFIN
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